A STRIDULATORY STRUCTURE IN CHRYSOPIDAE
(Neuroptera)

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Stridulation has not previously been reported in the Order Neuroptera. However, a stridulatory mechanism is present in both sexes of *Meleoma schwarzi* (Banks), 1903, n. comb. (*Chrysopa*).

M. schwarzi is referred to *Meleoma* on the basis of the male genitalia (Figures 2, 3, 5). In this genus, a complete set of genitalic elements is present: transverse arch, gonarcus with mediuncus, pseudopenis, parameres, gonapsis, and gonocristae. Distinctive characteristics of *schwarzi* are: transverse arch (Fig. 5, t.a., shaded area) lacks a median tooth; undersurface of mediuncus with scale-like sculpture; pseudopenis upcurved, spatulate; parameres flat plates on surface of bowl-like depression surrounding pseudopenis; gonopsis pointed, slightly curved, with lateral field of short, seta-like gonocristae.

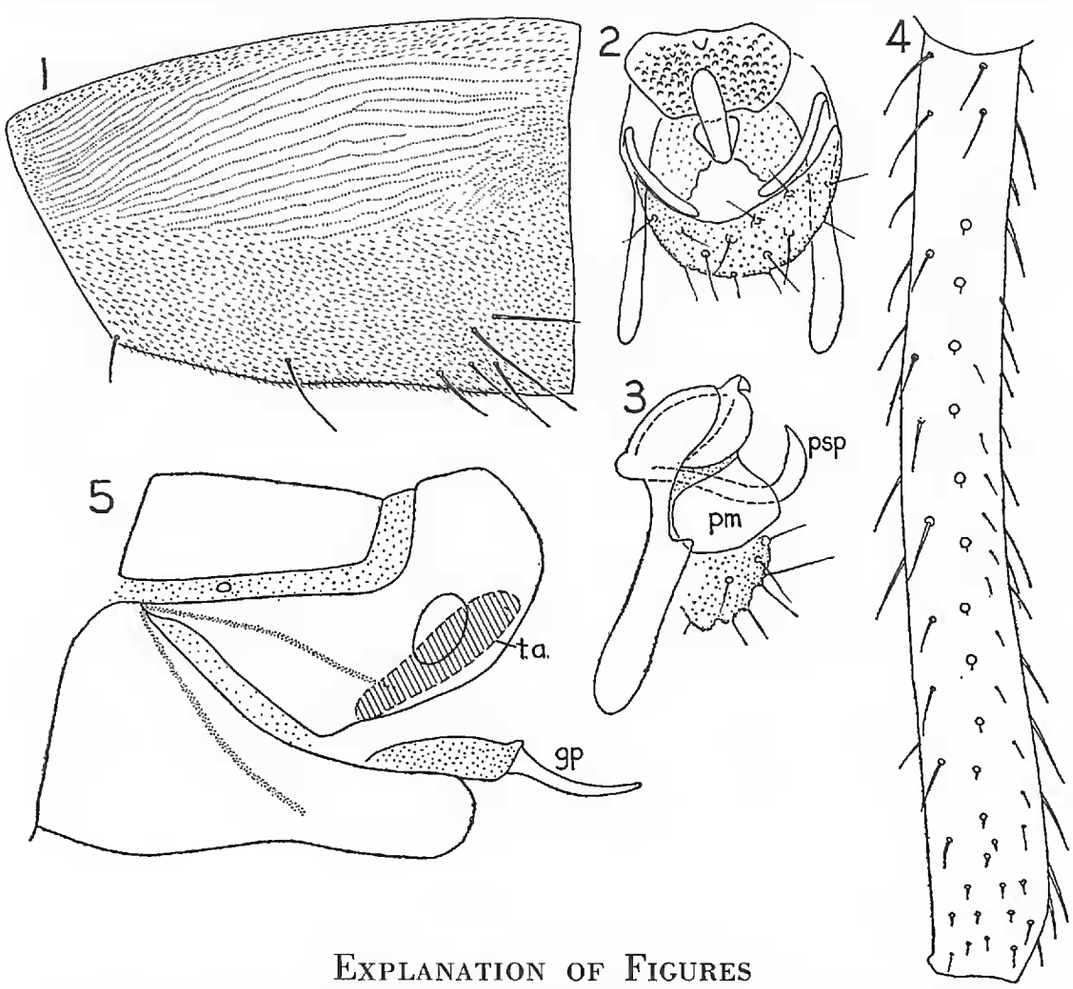
SPECIMENS EXAMINED.—*New Mexico:* Las Vegas H[ot] S[prings], 5-VIII, Barbour and Schwarz (Type, U.S.N.M. No. 6971, abdomen missing); Fort Wingate, 11-VIII, 6-VI (♂); Black Rock, 28-VIII-48, L. C. Wyman (♀). *Arizona:* Phoenix, 4-10-02, Oslar; South Fork Camp, White Mts., 26-VI-47, Sperry; Grand Canyon, S. Rim, about 7000 ft., 22-VII-34, D. Rockefeller; S. Rim, Grand Canyon, 22-VIII-41, Louis Schellbach (♀); Grand Canyon National Park, 3-IX-35, T. H. and G. G. Hubbell (♀), 20-VI-49, H. Lange (♂). *Oregon:* Klamath Co., Klamath Agency, 3-IX-50, at light, B. Malkin (3♀).

I have never seen a living specimen of this species. Observations of the biology, especially sound production and reception, would be of great interest. *Meleoma schwarzi* should be easy to recognize in the field; it is the only known species, inhabiting semi-desert areas in the southwest, which is green, with two brown dorsal longitudinal body stripes and pale antennae.

In this species, the second abdominal sternite of both the male and the female (Fig. 1) bears laterally a series of striae formed by coalescence of short microtrichia; on the ventral (medial) surface, the microtrichia are randomly dispersed and of normal length. Setae are confined to the ventral (medial) region of the sternite. On the third sternite, there is a slight patterning into rows of the microtrichia, which are of normal length. The second, and to a lesser extent the third, sternites appear somewhat more strongly sclerotized than do the others.

The hind femur (Fig. 4) bears on the inner surface a row of small wartlike tubercles, which represent modified setal bases. The setae are extremely short, and are located on the side of the tubercle facing the femoral apex. In this position, they would not interfere with contact between the tubercle and the abdominal ridges during stridulation.

Smith (1922) and Principi (1949) record courtship behavior which suggests the probable mode of evolution and operation of the stridulatory mechanism. In both sexes of *Chrysopa oculata*, and the male of *Chrysopa formosa*, the abdomen is jerked up and down rhythmically prior to mating. This habit is probably widespread in Chrysopidae. If the hind femora were held against the abdomen during this activity, weak sound production would result; favorable response by the opposite sex might result in selection



Explanation of Figures

Meleoma schwarzi (Banks): Fig. 1, left lateral view of second abdominal sternite of male, showing striae; Fig. 2, male genital armature, posterior view; Fig. 3, same, lateral view; Fig. 4, inner surface of right hind femur, same scale as Fig. 1, showing row of modified setal bases; Fig. 5, lateral view of male abdomen. Gp, gonapsis; pm, paramere; psp, pseudopenis; t.a., transverse arch.

of an improved sound-producing mechanism. If this sequence has taken place, *M. schwarzi* may be expected to stridulate by rubbing the abdomen against the femora, rather than the reverse. Sound is probably received by the alary chordotonal organs. Other possible sound receptors are the pedal chordotonal organs, and Johnston's organ.

All species of *Meleoma*, with the exception of *schwarzi*, exhibit strong sexual dimorphism. The scapes are usually lengthened, and widely separated medially; the flagellum may have the basal segments inflated and fused. There is often a deep, seta-lined cavity in the frons, or the anterior surface of the scape. In *M. signoretti* Fitch, a long horn, bearing an apical tuft of setae, is located on the vertex. The face is characteristically broad, and the eyes relatively small, in both sexes. In one species, the radial sector in the male hind wing is inflated.

No observations of mating in *Meleoma* have been published, nor have histological studies of the aberrant structures been made. It may be conjectured that these structures are concerned with either attraction of the female to the male, or, more likely, olfactory or gustatory stimulation of the female during courtship.

None of these specializations is present in *M. schwarzi*. In both sexes, the face is narrow, the eyes large, and the antennae and wings quite normal. Stridulation is a substitute for, rather than a supplement to, the sexually dimorphic characters of the other species. Probably it serves a parallel function—attraction of the sexes, or stimulation during courtship.

Sexual dimorphism and modification of non-genitalic structures in connection with courtship are exceedingly rare in the Chrysopidae. It is therefore of great interest that two such mechanisms, totally different in structure should arise, apparently independently, within the same genus.

References

Banks, N.

1903. Revision of the Nearctic Chrysopidae. Trans. Amer. Ent. Soc. *29:* 137:162.

Principi, M.

1949. Contributi allo Studio dei Neurotteri Italiani. VIII. Morfologia, Anatomia e Funzionamento degli Apparati Genitali nel Gen. *Chrysopa* Leach. Bol. Inst. Ent. Univ. Bologna *17:*316-362.

Smith, R.

1922. Biology of the Chrysopidae. Cornell Univ., Agr. Expt. Sta., Mem. 58:1285-1372, pl. 85-88.